

WHAT IS CLAIMED IS:

1. An optical disk apparatus comprising:

an optical head having: lens means of converging light from a light source onto an optical disk; and a photodetector for detecting the light thus converged and then reflected from said optical disk;

tracking error signal generating means of generating a tracking error signal in order to perform tracking control on the basis of said detected light;

detecting means of detecting a disk tilt DT indicating the amount of tilt of said optical head relative to said optical disk; and

calculating means of calculating a lens shift LS indicating the amount of shift of said lens means relative to said optical head, according to a predetermined rule on the basis of said generated tracking error signal and said detected disk tilt DT.

2. An optical disk apparatus according to Claim 1, wherein said predetermined rule is expressed by the following Equation 1

$$[\text{Equation 1}] \quad T = a \cdot LS + b \cdot DT$$

which is satisfied among: the value T of said generated tracking error signal; said detected disk tilt DT; and said lens shift LS to be calculated; when predetermined constants a and b are given.

3. An optical disk apparatus according to Claim 2, wherein

said detecting means can detect said disk tilt DT.

4. An optical disk apparatus according to Claim 3 comprising optical head driving means of driving said optical head within the cross section in a radius direction of said optical disk on the basis of the result of said detection of said disk tilt DT, wherein

when said tracking error signal is detected, said optical head is driven so that said detected disk tilt DT substantially becomes zero.

5. An optical disk apparatus according to Claim 2, wherein:

said detecting means can detect the reproduction state of the information from said optical disk;

said optical disk apparatus comprises optical head driving means of driving said optical head within the cross section in a radius direction of said optical disk on the basis of the result of said detection of said reproduction state of said information; and

when said tracking error signal is detected, said optical head is driven so that said reproduction state of said information becomes optimum.

6. An optical disk apparatus according to Claim 5, wherein:

said detection of said reproduction state of said information indicates the detection of the amplitude and/or the

jitter of a signal used in the reproduction of said information;
and

said being driven such that said reproduction state of said information becomes optimum indicates being driven so that said amplitude is maximized and/or said jitter is minimized and thereby so that said disk tilt DT substantially becomes zero.

7. An optical disk apparatus according to Claim 2,
wherein:

said detecting means can detect (1) a lens tilt LT indicating the amount of tilt of said lens means relative to said optical head and (2) the reproduction state of the information from said optical disk;

said optical disk apparatus comprises lens driving means of driving the lens center axis of said lens means within the cross section in a radius direction of said optical disk on the basis of the result of said detection;

in order to detect said disk tilt DT, said lens means is driven so that said reproduction state of said information becomes optimum; and

said disk tilt DT is detected on the basis of said detected lens tilt LT in the situation that said lens center axis of said lens means has been driven so that said reproduction state of said information becomes optimum.

8. An optical disk apparatus according to Claim 7,
wherein:

said detection of said reproduction state of said information indicates the detection of the amplitude and/or the jitter of a signal used in the reproduction of said information;

said being driven so that said reproduction state of said information becomes optimum indicates being driven such that said amplitude is maximized and/or said jitter is minimized; and

after said lens tilt LT is detected in order to detect said disk tilt DT, said tracking error signal is detected in the situation that said lens means has been driven so that said lens tilt LT substantially becomes zero.

9. An optical disk apparatus according to Claim 1, wherein said tracking error signal is detected in the mirror region of said optical disk.

10. An optical disk apparatus according to Claim 3 or 7, wherein said tracking error signal is detected by detecting the average level of said tracking error signal in the OFF-state of tracking control in the data region in the vicinity of the disk radius position of said optical disk where said disk tilt DT or said lens tilt LT is detected.

11. An optical disk apparatus according to Claim 1 comprising conveying means of conveying said optical head in a radius direction of said optical disk on the basis of said calculated lens shift LS.

12. A method of calculating the amount of lens shift

comprising:

a converging step of converging light from a light source onto an optical disk by means of lens means;

a detecting step of detecting the light converged onto said optical disk and then reflected from said optical disk;

a generating step of generating a tracking error signal in order to perform tracking control on the basis of said detected light;

a disk tilt detecting step of detecting a disk tilt DT indicating the amount of tilt of an optical head having said lens means relative to said optical disk; and

a calculating step of calculating a lens shift LS indicating the amount of shift of said lens means relative to said optical head, according to a predetermined rule on the basis of said generated tracking error signal and said detected disk tilt DT.

13. A program for causing a computer to serve as all or part of said tracking error signal generating means, said detecting means, and said calculating means of said optical disk apparatus according to Claim 1, 2, 9 or 11.

14. A program for causing a computer to carry out all or part of said generating step, said disk tilt detecting step, and said calculating step of said method of calculating the amount of lens shift according to Claim 12.

15. A computer-processable medium carrying a program for

causing a computer to serve as all or part of said tracking error signal generating means, said detecting means, and said calculating means of said optical disk apparatus according to Claim 1, 2, 9 or 11.

16. A computer-processable medium carrying a program for causing a computer to carry out all or part of said generating step, said disk tilt detecting step, and said calculating step of said method of calculating the amount of lens shift according to Claim 12.